

Spaceport News

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STS-131 to test water filtration for use in IVs

By Steven Siceloff
Spaceport News

Technology for a water filtration system initially developed at Kennedy is going to get a major test during the STS-131 mission. It will be called on to create water clean enough to be used intravenously, commonly known as an IV.

If it works, the system could prove critical to future astronauts if they have a medical emergency while traveling far from Earth. It also could find earthbound uses by the military, in remote locations or in humanitarian relief efforts.

Dr. Philip Scarpa's team at Kennedy partnered with NASA's Glenn Research Center in Ohio to develop a device that filters microscopic contaminants, including heavy metals and toxins, out of drinking water to produce fluid as sterile as any made on Earth.

"On every space mission, there's a potential of getting sick or getting hurt," Scarpa said. As



Photo courtesy of Philip Scarpa/NASA

Kennedy's Philip Scarpa, left, worked with DeVon Griffin from Glenn Research Center in Ohio to develop the IVGEN machine that will be tested on the International Space Station. The filtration device is designed to produce water clean enough to inject intravenously.

Kennedy's medical operations manager, Scarpa helps provide medical support to the astronauts before they launch into space and after they land.

On Earth, several medical conditions require IV fluids, usually for rehydration or for delivering medications. The NASA

International Space Station Patient Condition Database identified 115 medical conditions that could occur on the space station and would require IV fluids to be administered.

For example, an astronaut with severe burns can require about 100 liters of IV fluids for weeks,

with 30 liters needed in the first three days. One recent NASA study reported that a mission to Mars may need as much as 248 liters of IV fluids on board. Currently, there are only 12 liters of fluid stored on the station.

Even less severe conditions, such as broken bones or motion sickness,

can deplete the stock quickly, especially if more than one astronaut is sick or injured.

At more than two pounds of weight per liter, IV fluids are very costly to take into space. They also take up a lot of volume, and due to their need for sterility, IV fluids have a limited shelf life.

"On board or 'in-situ' production of IV fluids needed for medical treatments, could greatly reduce these costs and storage limitations, and would give NASA much more flexibility in how it can use the water it already has on the spacecraft," Scarpa said.

Prior to partnering with Glenn in 2007, Scarpa teamed up with researchers from the United Kingdom and Canada to develop the technology. Called "Project Clearwater," the team started its research in 2005 with a grant from the Florida Space Research Institute.

See **FILTER**, Page 2

Inside this issue . . .

Russian module



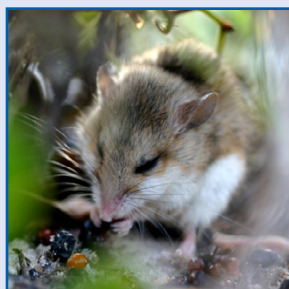
Page 3

FIRST competition



Page 3

Beach mice survey



Page 6

Heritage: Atlantis arrives 25 years ago



Page 7

Garver's first LAUNCH forum focuses on water

Kennedy recently hosted a diverse group of entrepreneurs, venture capitalists, scientists, media, and government and business leaders who all have a common goal: a sustainable future on Earth and in space.

The LAUNCH initiative, as it's called, gives these innovators a chance to participate in solution-driven discussions with their peers about air, water, food, energy, mobility and even cities. NASA's Deputy Administrator Lori Garver hosted the first LAUNCH forum, which focused on water, March 16-18.

"I believe that in government most people do go into government to serve the people and to find ways that we can advance society,"

More info online

To learn more about the innovators and their proposed solutions, and for a list of the LAUNCH council members, visit www.launch.org

Garver said. "NASA's going to continue to do that right here from the Cape in new ways and investing in technology."

NASA is a founding partner of the initiative, along with the U.S. Agency for International Development, the U.S. State Department and Nike.

For this forum, 10 entrepreneurs from around the world brought their water ideas to the table. One such idea focused on

over-irrigation of plants.

According to Dr. Marc Van Iersel, agriculture is responsible for 70 percent of freshwater use worldwide, and there currently isn't a precise indicator to determine when and for how long plants should be watered.

So, Van Iersel and other faculty members from the University of Georgia are developing affordable soil moisture sensors to save water, increase efficiency and reduce the environmental impacts of plant production, while maximizing potential growth. They are working closely with growers to guide development of the system, and preliminary findings have revealed water savings of up to 83 percent.

Another technology focuses on

testing the quality of drinking water, which could prove critical for long trips to space.

"The things that you carry to space are absolutely critical. Weight is very important and the recycling water has so been a very, very large goal for us that we've made a lot of technological innovation in that we hope then could be helpful to society at large," Garver said.

Garver is confident that the Kennedy team will play an important role in the future of sustainability.

Garver said, "People love to work here. They do a fabulous job. They work tirelessly at it because they believe they're contributing to the broader good and to these long-term goals."

From FILTER, Page 1

"When we started looking into this, we thought we would quickly find out that someone had done this already," Scarpa said. "After our background research, we were surprised that no one had been successful with this before. It's not easy. The requirements for medical-grade water for injection are very strict and difficult to meet without large factory-based processes."

"A perfect result would be to have output water that satisfies the strict standards for water for injection without any failures or performance issues."

Dr. Philip Scarpa,
Kennedy's Medical
Operations Manager

Devising a workable filter system for space also presents more hurdles than just removing contaminants successfully.

Without gravity, water can channel by adherence to its container and bypass a filter entirely. Mixing of the final salt water solution also could be incomplete, and launch vibrations could cause the device to release small particulates into the lines. Also, without gravity, the air in the system doesn't separate out from the fluid. This may form bubbles in critical areas, such as blocking off filters. If the filters are blocked, the water will not be screened.

"Bubbles are probably the biggest concern," Scarpa said. "Bubbles in IV fluids are dangerous for a patient as well. If entered into the veins, they could cause a stroke by blocking the brain's blood flow."

Scarpa's team devised the use of micron-sized filters to trap and squeeze out the bubbles from the system.

By 2006, the team had developed a suitcase-sized device that filtered both

drinking and dirty water, producing ultra-pure sterile water that meets all U.S. Pharmacopeia standards.

Based on that initial success, the team from Kennedy and Glenn developed a flight-ready system. Dubbed "IVGEN" for IntraVenous Fluid Generation, it will seek to produce IV-grade water from available space station drinking water.

In the station's Microgravity Sciences Glovebox, astronauts will run the device several times beginning in early May, and two bags of sterile saline solution will be frozen and returned to Earth on STS-132 for testing.

"A perfect result would be to have output water that satisfies the strict standards for water for injection without any failures or performance issues," Scarpa said.

He is optimistic the device will work because the system was extensively tested on the ground and in the Zero-G aircraft.

As NASA ventures out farther into space, astronauts will require



Photo courtesy of Philip Scarpa/NASA

The "Project Clearwater" device was built by Philip Scarpa's team at Kennedy to create IV-grade water out of drinking water. The suitcase-sized filter device was tested extensively and used as a basis for the IVGEN filtration system going to the International Space Station.

longer stays and farther destinations with little chance for immediate return or resupply from Earth. Producing medical-grade IV solutions is key to mission success.

In addition to spaceflight, Scarpa realizes the great potential benefit of this technology for applications right here

on Earth, so he has been developing a small, handheld unit that could be used by the military in remote field operations, in submarines and on ships, and in medical relief efforts.

Scarpa said, "IV fluid production anytime, anywhere, has great medical benefit on the ground as well as in space."

'Dawn' of new space era emerges as Russia shares view of Rassvet

As space shuttle Atlantis embarks on its final scheduled flight, the STS-132 mission, it will mark the first time Russian cargo will fly from Kennedy to the International Space Station.

That cargo, the Mini-Research Module, or MRM-1, was displayed for the news media during an event hosted by NASA and the Russian Federal Space Agency, known as Roscosmos, at the Astrotech payload processing facility at Port Canaveral, Fla.

The MRM-1 also is known as Rassvet, which translates to "dawn." Once aboard the station, it will be attached to the Earth-facing port of the Russian-built Zarya control module, the station's first module.

"I would describe it as bittersweet," said

Robby Ashley, STS-132 payload manager.

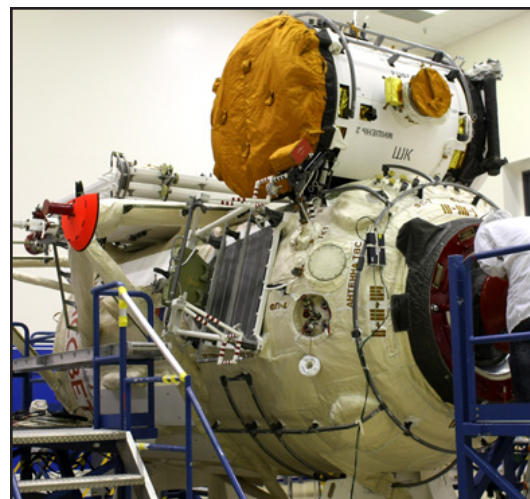
"There's a lot of excitement about it, but at the same time we know after this we'll be doing other things."

The MRM-1 will be used for scientific research and cargo storage, and will provide an additional docking port for a Soyuz or Progress spacecraft.

Mikhail Kashitsyn is the deputy technical manager and head of the MRM-1 prelaunch processing for the design bureau division of RSC Energia, the prime contractor to Roscosmos.

Kashitsyn said, "The MRM -1 will be the largest piece of Russian space hardware ever to launch on an American rocket."

Atlantis and the STS-132 crew are targeted to launch with MRM-1 on May 14 at 2:28 p.m. EDT.



NASA/Dimitri Gerondidakis

A media event was hosted by NASA and the Russian Federal Space Agency, Roscosmos, to showcase the Russian-built Mini-Research Module-1, or MRM-1, in the Astrotech payload processing facility at Port Canaveral, Fla. Supplies and other cargo have already been installed into the MRM-1. The module is on display for the media before its transport to the Space Station Processing Facility at NASA's Kennedy Space Center.

Brevard students strive for FIRST at competition

By Linda Herridge
Spaceport News

Family and friends cheered and occasionally broke into a frenzied version of "the wave," while several Brevard County school teams competed in the For Inspiration and Recognition of Science and Technology Robotics, or FIRST, competition.

Inside the University of Central Florida's giant arena in Orlando on March 12 and 13, student teams checked and rechecked their robot creations before sending them into a ring for a variation of a three-on-three soccer match. The competition was the culmination of six weeks' worth of work with mentors who helped design and build the robots.

Kennedy civil servant and contractor workers were among several mentors for the local high school teams, including the Rockledge, Cocoa Beach and Viera team called the "Pink Team," Cocoa's "Bionic Tigers," Palm Bay's "Pira Tech Ro-

botics," Bayside's "Bionic Bears" and Melbourne's "Team Voltage."

Marion Passmore, a math and robotics teacher at Rockledge High started a FIRST team in 1999, and continued it as student interest expanded to other schools. Now, the Pink Team includes 45 students from three high schools.

"The FIRST competition is more than learning how to build a robot. It's about inspiring kids," Passmore said.

At the regional competition in Los Angeles, the

Pink Team won an Imagery Award and placed in the top eight teams during the semifinal competition.

Bionic Tigers' mentor Bill Benson is an engineer with NASA's Launch Services Program at Kennedy. He said he enjoys working with students and passing on his knowledge to help them seek fulfilling careers in the science, technology, engineering and math, or STEM, fields.

"The competitions are an absolute blast, and helping the students build something and getting it

to work well is very satisfying," Benson said.

During the regional competition in Denver, the 15-member Bionic Tigers team won the Industrial Design Award and competed in the semifinals.

Lisa Valencia, an education project specialist is Kennedy's FIRST coordinator. She said the competition helps get students excited about STEM careers.

"They apply what they learn in the classroom to design a robot to overcome a challenge and also learn how important teamwork

WORD ON THE STREET

"The FIRST competition was held last month at the University of Central Florida in Orlando. What tasks would you want your robot to do if you owned one?"

Page 8

is," Valencia said. "The students work with mentors who are engineers, scientists and technicians."

This year, Kennedy co-sponsored the Florida regional competition and provided live Web casts during the competition.

FIRST was founded in 1989 by inventor and entrepreneur Dean Kamen to inspire the interest and participation of young people in science and technology.

Nationwide, more than 60,000 volunteers make FIRST happen, supported by a network of more than 2,000 individuals, corporations, and educational and professional institutions. There are about 1,300 FIRST teams worldwide.



NASA/Jim Grossmann

The "Bionic Tigers" FIRST team prepares their robot for the next match during the FIRST regional competition at the University of Central Florida arena in Orlando. From left, are, Bill Benson, mentor and Kennedy's Launch Services Program engineer; Cocoa High School student Amy Adams; John Bauschlicher, mentor and LSP engineer; and Roger Anderson, a United Space Alliance mentor.

Scenes Around Kennedy



NASA/Jim Grossmann

Workers demolish the Vertical Processing Facility, or VPF, on March 15. The demolition, which started in February and is about half done, is scheduled to be finished by July. About 90 percent of the debris will be recycled.



Photo courtesy of Terry Moody, Space Gateway Support

Members of Space Gateway Support Protective Services team practice aircraft rescue fire fighting tactics at the midfield park site adjacent to the Shuttle Landing Facility on March 10. Instructors from Kellogg Community College manipulate situations so firefighters can sharpen their skills and adapt to perform the training objectives effectively. Firefighters participate in several evolutions and take on different roles each time they respond to an incident.



NASA/Amanda Diller

The payload canister containing the multi-purpose logistics module Leonardo, standing vertically on a transporter, arrives at Launch Pad 39A at Kennedy on March 19. The seven-member STS-131 crew will deliver Leonardo, filled with resupply stowage platforms and racks, to the International Space Station. STS-131 will be the 33rd shuttle mission to the station and the 131st shuttle mission overall. Launch is scheduled for April 5.



NASA file /Kim Shiflett

The Operations and Checkout Building renovation effort was awarded the Association of General Contractors Aon Build America Award on March 19. The award is one of 11 nationally with this category being Heavy Renovation, Federal. The event at the Marriott World Center in Orlando, Fla., was attended by more than 600 people.



For NASA

A student gets to put on a spacesuit, or extravehicular mobility unit, during Florida Space Day 2010 in Tallahassee. Representatives from Florida's space industry met with legislators and government officials in an effort to ensure Florida remains at the forefront of the nation's space program.



NASA file /Kim Shiflett

Kennedy Center Director Bob Cabana, left, and U.S. Sen. Bill Nelson, discuss spaceflight during a forum at Brevard Community College in Cocoa, Fla., on March 19.

Study to reveal beach mouse habitats along coastline

By Linda Herridge
Spaceport News

According to Eric Stolen, a wildlife ecologist with Innovative Health Applications LLC, one thing is certain -- the southeastern beach mice population is dwindling along the east coast of Florida.

To determine how much, Kennedy Space Center, the Canaveral National Seashore, the Merritt Island National Wildlife Refuge, or MINWR, and Cape Canaveral Air Force Station recently conducted a habitat occupancy survey of this threatened species.

"The projected acceleration in sea-level rise that may occur at Kennedy due to global climate change may result in the loss of

extensive amounts of habitat for the southeastern beach mouse," Stolen said. "Our group is studying the potential impacts to this and other threatened and endangered species."

Stolen said the purpose of the annual survey is to understand the factors that influence the distribution of the beach mouse on Kennedy and surrounding federal lands. IHA is the center's medical and environmental support contractor and leads the study.

In February, wildlife biologists placed special tracking tubes containing tracking papers at sites about one-third of a mile apart, from the north end of the Canaveral National Seashore in Volusia County, south to the jetty at Port Canaveral. The tubes remained out for three nights, giving the tiny nocturnal mice

ample opportunities to climb in, eat the sunflower seed bait and leave their footprints on the papers.

By making repeated attempts to detect the mice at each site, Stolen said information can be gathered about how often they miss them and use that to adjust naïve occupancy estimates.

"When trying to measure habitat occupancy, a big problem is that when you visit a site and don't record the species there are two possible explanations: either the site is not occupied, or the site is occupied but we missed it," Stolen said.

MINWR Supervisory Wildlife Biologist Mike Legare said the refuge is part of the U.S. Fish and Wildlife Service, which is responsible for endangered species.

"Our role in this survey was to coordinate and facilitate the research efforts," Legare said.

The refuge coordinated the logistics of the study and provided several all-terrain vehicles so workers could travel easily from one site to the next.

Canaveral National Seashore Resource Management Specialist John Stiner said the survey was in direct support of the organization's primary mission to preserve and protect the outstanding natural, scientific and ecologic values contained within its boundaries.

"This includes 13 federally protected animal species, including the beach mouse," Stiner said. "In order to effectively protect the beach mouse and its key habitats, we have to know where they are within the park."

During a pilot study in December 2008, along six miles of Kennedy's beaches, the team recorded mice at 32 of 100 sites, and gathered 500 tracking papers, 58 of which contained footprints. Stolen said based on occupancy modeling, they predicted about 42 percent of the habitat was occupied.

IHA Wildlife Ecologist Donna Oddy has studied southeastern beach mice for about 20 years and helped coordinate this year's survey. Oddy said Kennedy and surrounding federal lands are the last stronghold for this subspecies whose range has declined by 79 percent during that time.



Photo courtesy of Russ Lowers,
Innovative Health Applications

Innovative Health Applications Wildlife Biologist Becky Bolt retrieves a beach mouse survey tube.

Historically, the southeastern beach mouse habitat ranged from Ponce Inlet in Volusia County, to Hollywood Beach in Broward County. Currently, the species is mostly restricted to the survey range, though Oddy said there are remnant populations at New Smyrna Dunes, Sebastian River State Park, and Pelican Island and Archie Carr national wildlife refuges.

Legare said the presence of the beach mice and other species along the coast is another example of the benefit of the federal conservation partnerships between NASA, MINWR, the Canaveral National Seashore and Cape Canaveral Air Force Station.



Photo courtesy of Donna Oddy,
Innovative Health Applications

A southeastern beach mouse, which can be found in the scrub near the coastline of Cape Canaveral Air Force Station, chews on a sunflower seed.



Photo courtesy of Russ Lowers/Innovative Health Applications

Carlton Hall, the IHA supervisor of ecological programs, retrieves a beach mouse survey tube and inspects the tracking paper for mouse footprints.

Remembering Our Heritage



NASA file/1985

Space shuttle Atlantis arrives at Kennedy's Shuttle Landing Facility on April 13, 1985. Atlantis lifted off on its maiden voyage Oct. 3, 1985, on mission 51-J, the second dedicated Department of Defense flight. Later missions included the launch of the Galileo interplanetary probe to Jupiter on STS-34 in October 1989, and STS-37, with the Compton Gamma Ray Observatory as its primary payload, in April 1991. Atlantis is named after a two-mast sailing ship that was operated for the Woods Hole Oceanographic Institute from 1930 to 1966.

Atlantis arrived at spaceport 25 years ago

By Kay Grinter
Reference Librarian

It has been 25 years and 31 missions since space shuttle Atlantis arrived at Kennedy atop a Shuttle Carrier Aircraft on April 13, 1985.

Delivery of Atlantis, the fourth and last planned orbiter in NASA's shuttle fleet, followed the delivery of Columbia, Challenger and Discovery, in succession. Although the manufacture of a fifth shuttle had been discussed, none had been authorized for NASA's Space Transportation System, as the Space Shuttle Program originally was called.

Following the 1986 Challenger accident, shuttle Endeavour was authorized to be built.

Atlantis' namesake was the primary oceanographic research vessel operated for the Woods Hole Oceanographic Institute from 1930

to 1966. In the day-to-day world of shuttle operations, however, shuttles are known by a more prosaic designation. Atlantis is commonly referred to as OV-104, for Orbiter Vehicle-104.

The experience gained during the assembly of the first three shuttles enabled Atlantis, essentially a twin of Discovery, to be completed with a 49.5 percent reduction in man-hours compared to the time spent assembling Columbia, the first shuttle off the assembly line. A rather significant part of the decrease may have been due to the greater use of thermal protection blankets, which required less manpower to install than heat tiles.

Atlantis' rollout from the Rockwell manufacturing plant in Palmdale, Calif., was on March 6.

Atlantis' departure from Edwards Air Force Base was put on standby until Discovery lifted off on the STS 51-D mission on April

12. The cross-country ferry flight was completed in two days, stopping overnight at Ellington Air Force Base in Texas.

Processing of Atlantis began immediately upon its arrival at Kennedy and went smoothly. Atlantis lifted off on its maiden voyage from Launch Pad 39A six months later on Oct. 3, 1985, on the STS 51-J mission, the second dedicated Department of Defense flight.

As NASA's launch commentator said, "Liftoff of Atlantis, a new orbiter joins the shuttle fleet and it has cleared the tower," clapping and cheers erupted in the Launch Control Center.

Atlantis carried on the spirit of the two-mast ship after which it was named, initiating several important voyages itself with the deployment of the Galileo planetary probe in 1989 and the Compton Gamma Ray Observatory in 1991.

After the first Mir orbiter

docking system was installed in the forward end of Atlantis' payload bay, its next adventure between 1995 and 1997 was to make the first seven shuttle dockings with the Russian space station, paving the way for dockings to the yet unassembled International Space Station.

Even after a quarter of a century, the vehicle still serves its crews well.

"It's truly an amazing vehicle," STS-129 Commander Charlie Ho-baugh said of Atlantis after landing at Kennedy on Nov. 27, 2009.

Atlantis' next mission is planned to be its last. Processing is well under way for the STS-132 mission, targeted to launch May 14.

The six-member crew will deliver an Integrated Cargo Carrier and the Russian-built Mini-Research Module-1, known as Rassvet, to the International Space Station. STS-132 will be the 34th mission to the station and the 132nd shuttle mission overall.

NASA Employees of the Month: April



NASA/ Tom Farrar

Employees of the month for April are, from left: Michael Ciannilli, Launch Vehicle Processing Directorate; Barry Connock, Safety and Mission Assurance Directorate; Mark Nurge, Engineering Directorate; James Fesmire, Engineering Directorate; Chad Moeller, Center Operations; and Julee Chamberlain, Chief Financial Office. Not pictured are, Mark Page, Information Technology and Communications Services; Clark “Skip” Owens, Launch Services Program; and Deborah Cole, Constellation Space Transportation Planning Office, employee of the quarter.

Looking up and ahead . . .

April 5	Launch/KSC: Discovery, STS-131; 6:21 a.m. EDT
Targeted for April 12	Launch/CCAFS: Falcon 9/Dragon; Window 11 a.m. to 3 p.m. EDT
Planned for April 18	Landing/KSC: Discovery, STS-131; 8:38 a.m. EDT
April 19	Launch/CCAFS: Atlas V, OTV; 10 p.m. to 2 a.m. EDT
Targeted for May 14	Launch/KSC: Atlantis, STS-132; 2:28 p.m. EDT
May 17	Launch/CCAFS: Delta IV, GPS IIF-1; 3:19 to 3:37 a.m. EDT
No earlier than July 21	Launch/CCAFS: Falcon 9/Dragon, NASA COTS - Demo 1; TBD
Targeted for July 29	Launch/KSC: Endeavour, STS-134; 7:51 a.m. EDT
Targeted for Sept. 16	Launch/KSC: Discovery, STS-133; 11:57 a.m. EDT
Targeted for Nov. 17	Launch/CCAFS: Atlas V, GPS IIF-2; TBD
No earlier than Nov. 22	Launch/VAFB: Taurus, Glory; TBD
Aug. 5, 2011	Launch/CCAFS: Atlas V, Juno; TBD
Aug.15, 2011	Launch/Reagan Test Site: Pegasus, NuSTAR; TBD
Sept. 8, 2011	Launch/CCAFS: Delta II Heavy, GRAIL; TBD
To Be Determined	Launch/VAFB: Delta II, Aquarius / SAC-D Satellite; TBD
To Be Determined	Launch/VAFS: Delta II, NPP; TBD
No Earlier Than Oct. 14, 2011	Launch/CCAFS: Atlas V, Mars Science Laboratory; TBD

WORD ON THE STREET

The FIRST competition was held last month at the University of Central Florida in Orlando.
What tasks would you want your robot to do if you owned one?



“Get some guitar lessons. The robot would be able to repeat itself and not get angry.”

Frank Caldwell,
with United Space Alliance

“Take the trash out to the road on garbage days. I think I’d even share my robot to do that for the neighbors.”

Larry Hersey,
with URS Corp.



“Cook. I eat out a lot and I’d rather have some good home-cooked meals more often,”

Allan Villorin,
with NASA

“I’d have my robot go out and make me some money . . . maybe do my job a couple of days a week.”

Horace Elmore,
with Star Base Development Co.



“Clean my garage. Maybe have it take my wife to the store . . . a chauffeur sure would be nice.”

Don Shrum,
with United Space Alliance



John F. Kennedy Space Center

Spaceport News

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